
Space Weather Forecast

Issued on Thursday, 31 March 2022 at 13:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Moderate-class flares likely throughout. Slight chance of further S1 or above solar radiation storms. G1-G2/Minor-Moderate geomagnetic storms expected on Days 1 and 2 (31 March and 1 April), with Chance of a G3/Strong storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been at High levels over the past 24 hours, with a Strong X-ray flare, which originated from a sunspot region 2975 in the northwest quadrant and resulted in a minor radio blackout. The strong flare produced a coronal mass ejection (CME) seen in available coronagraph imagery, and this may give a glancing blow to Earth on Day 2 or early on Day 3. There are currently four numbered sunspots on the visible disc, with 2976 in the northwest quadrant, currently the largest sunspot, but remains stable. Meanwhile, 2975 (also in the NW quadrant) remains magnetically complex and produced the recent strong X-ray flare. 2978 continues to rotate across the SE quadrant, and intermediate spots continue to develop. The remaining sunspots on the disc are relatively small and magnetically simple.

Solar Wind / Geomagnetic Activity: Solar wind speeds started the period mostly Slow becoming slightly elevated by around 30/2100 UTC, and then on arrival of a coronal mass ejection (CME) around 31/0200 UTC became elevated with a peak of 604 km/s at 31/0616 UTC. The strength of the Interplanetary Magnetic Field started at weak levels, before becoming Moderate to Strong for a period after the CME arrived. Geomagnetic activity started the period at Quiet levels, with an increase to reach Active to minor storm levels from around midnight.

Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV) measured at GOES-16 showed an increase following the strong flare to reach minor storm (S1) levels for a short period around 31/0600 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mostly Low, but with the chance of further Moderate-class flares, and a slight chance of a strong X-ray flare, mainly from region 2975 in the northwest quadrant.

Solar Wind / Geomagnetic Activity: The 28th March CME(s), arrived in the early hours of 31 March. The currently elevated solar winds and enhanced geomagnetic activity are anticipated to continue into Day 2 (1 April) before gradually weakening into Day 3 (2 April). However a further CME is forecast to give a solar wind and geomagnetic enhancement early on Day 3 (2 April) but confidence is currently low for detail. A fast wind from a coronal hole(s) influence is also forecast by Day 3 (2 April).

Energetic Particles / Solar Radiation: The continued activity of 2975 in particular gives the slight chance of further potential enhancements above the S1 threshold during the period.

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Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	80	60	30	10
Strong	G3	No	30	30	5	1
Severe	G4	No	10	10	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	Yes	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	20	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)